

RESULTS OF 1-D LOCATION CALIBRATION STUDIES RELATED TO THE TERRITORY OF NORTHERN EURASIA

Victor V. Kirichenko and Yury A. Kraev
Western Services Corporation
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ABSTRACT

During the last three years, new regional travel-time tables for different geotectonic provinces of Northern Eurasia were developed in the framework of the Russian Seismoacoustic Research for CTBT Monitoring project. This project is being performed by SAIC and its subcontractors: the Western Services Corporation, the Geophysical Survey of the Russian Academy of Sciences (RAS) and Complex Seismological Expedition (CSE) of the Joint Institute of Physics of the Earth of the RAS. One of the main objectives of the project is to calibrate travel times for regional seismic waves travelling to the seismic stations of the Russian Academy of Sciences included in the Comprehensive Nuclear-Test-Ban Treaty International Monitoring System (IMS).

The territory of the Northern Eurasia was initially subdivided into 11 provinces based on the results of the analysis of Pn travel times as well as taking into account recently published papers on seismic and tectonic regionalization of Northern Eurasia. We presented newly developed travel-time tables for different geotectonic provinces at the 21st and 22nd Seismic Research Symposiums. Upon completion the effort on collection and analysis of travel time data for 11 studied provinces we came to the conclusion that the territory of Northern Eurasia may be subdivided as follows: only three large geotectonic provinces for Pn and Sn phases (platform areas, paleozoic massifs and young platform as well as tectonically active regions); only two provinces for Pg phase and the only province for Lg phase. We present the recent regionalization of Northern Eurasia for our 1-D location calibration studies as well as newly constructed travel-time tables and their comparison with the IASPEI-91 tables. Also, source specific station corrections (SSSCs) for the stations of the RAS included in the CTBT IMS are presented as well as their comparison with SSSCs developed by other research groups.

In the framework of our project performance we review recently published and historical data on peaceful nuclear explosions in the former USSR. In the result we concluded that ISC location estimates for the number of PNEs are subjects of large (from about 20 km to 40 km and even more) errors. Details of our evidences are presented.

The newly constructed travel-time tables as well as their modeling errors were used for tests on re-location of the underground nuclear explosions at the territory of the former Soviet Union. A comparison between the mislocation estimates for the newly constructed travel-time tables, the IASPEI-91 travel-time tables and the ISC results is presented. We conclude that the newly developed 1-D regional travel-time tables are an effective tool to be used for seismic sources location at the territory of Northern Eurasia.

KEY WORDS: seismic regional characterization, location calibration.